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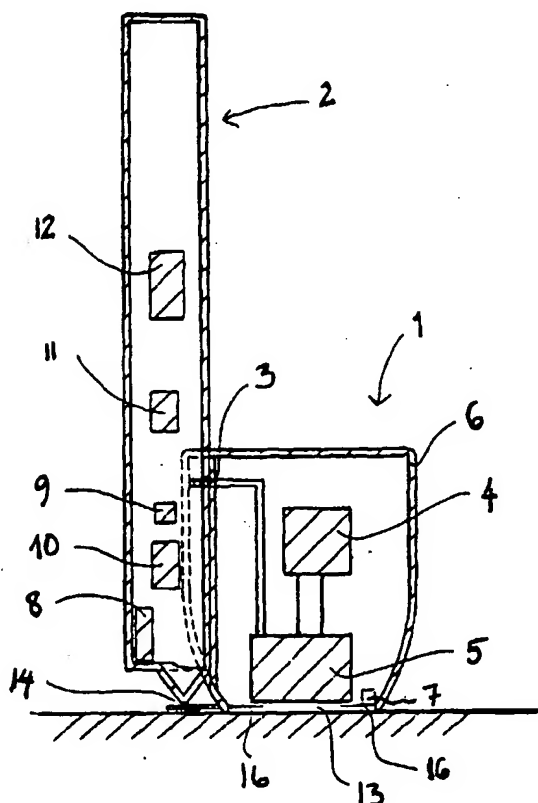
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(54) Title: **PRINTER DEVICE CONNECTABLE TO A DIGITAL PEN**



(57) Abstract: The present invention relates to a printer device (1) being connectable to a digital pen (2) by means of an interface (3). The interface (3) provides for mechanical and electrical connection of the printer device (1) to a digital pen (2), said digital pen (2) including a sensor (8) for sensing the position of the digital pen (2) on said printing surface, and the obtained navigation information is transferred to the printer device (1) by means of said interface (3).

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PRINTER DEVICE CONNECTABLE TO A DIGITAL PEN

Field of the invention

The invention relates to a combined printer device and digital
5 pen, of the kind apparent from the attached claim 1.

Background of the invention

There is an ongoing size reduction of all kinds of devices.
Mobile phones, for example, are becoming smaller and smaller.
10 This reduction of size is due to the wish amongst people to be
reachable at all times, accompanied by the desire and need to
have small phones, which can be carried along conveniently
everywhere. Further, people would very much like to have other
small, even miniaturised devices, doing different tasks and
15 being easy to bring along, meeting the growing demand of
people of being reachable everywhere, and also to be able to
perform a variety of tasks regardless of where the user is.

In the spirit of offering small devices enabling wireless
20 communication, there is a small, digital pen available on the
market, from Anoto, a subsidiary of C Technologies. This
digital pen includes a small camera device, registering and
keeping track of the position of the pen. By means of the pen,
a user may send anything he or she writes on a paper to any
25 computer in the world.

In order to use this digital pen, a special paper is needed,
on which the Anoto pattern is printed, consisting of very
small dots slightly displaced from a grid structure. A tiny
30 section of the pattern gives the exact location on the full
pattern. As the user writes or draws on this paper using the
digital pen, the pen creates a digital trace of whatever the
user does. The information is stored in the pen until the user

forwards it from the digital pen directly to a nearby personal computer. The information may be forwarded by means of Bluetooth™.

5 There are many situations where it would be desirable to have a portable multifunction device, further facilitating the demand on being reachable everywhere and providing means to perform a variety of tasks anywhere, in a wireless manner. It is an object of the present invention to provide such a
10 device.

Summary of the invention

An object of the present invention is to provide a combined printer device and digital pen, connectable to each other, and
15 thereby enabling a user to write whatever he or she wants to, and further to send the written texts to any mobile phone or computer in an easy manner.

This object is achieved, according to a first aspect of the
20 invention, by a printer device as defined in claim 1.

In accordance with one embodiment of the printer device, the printer device includes an interface for mechanical coupling as well as electrical direct contact with the digital pen.
25 This enables information exchange between the devices. The printer device may for example use the navigation information obtained by the digital pen, which makes it possible to manufacture a very simple printer device, containing basically only a printer head.

30

In accordance with another embodiment of the present invention, the printer device includes a memory for storing different templates. This feature makes it possible to store a

number of templates to be used for a number of different applications. Thereby one and the same writing pad may be used for all the different applications. Examples of such templates are as a fax template, an e-mail template, and an SMS
5 template.

In accordance with another embodiment of the present invention, the printer device and/or the digital pen includes a memory including bar codes, the bar codes corresponding to
10 different commands to be sent by means of the digital pen. This feature provides a simple way to instruct the digital pen to, for example, send a message. The user simply scans the bar code by means of the digital pen, which then interprets and effectuates the command included in the bar code.

15 In accordance with another embodiment of the present invention, the printer device includes one or more sensors for sensing the position of the printer device. This feature gives an alternative way to provide the printer device with
20 positioning information, for example when the specially designed Anoto paper is not being used.

Brief description of the drawing

Fig. 1a shows an embodiment of the invention, including a
25 printer device and a digital pen, from a top view.

Figs. 1b and 1c show the embodiment of the invention shown in fig. 1a from a side view.

30 Detailed description of preferred embodiments

In the spirit of offering useful and portable devices, small and wireless printers, easy to bring along, are desirable. One such small and wireless printer is the one invented by the

same inventor as the present invention, described in the pending patent application SE 0104383-5, and incorporated herein by reference. There are many applications for small, wireless printers, as will become evident in the following.

5

With reference to figs. 1a and 1b, an embodiment of the present invention will now be described.

A printer device 1 is shown, including, in this embodiment, only an ink cartridge 4 and a print head 5. The print head 5 could for example be an ordinary ink jet printer, where several nozzles under the influence of microprocessor controlled electrical signals eject tiny ink drops, which then build up a predetermined pattern. Alternatively, a bubble jet print head could be used, or any other suitable print head. The housing 6 of the printer device 1 has an opening (indicated at 13) at one end, where the print head 5 is situated in order to be able to print on a surface in question. The print head 5 could of course be located at any suitable location on the underside of the printer device 1.

A digital pen 2 is also shown in figs. 1a-1c, available from Anoto, which is a subsidiary of C Technologies. As described above in the introduction, the digital pen 2 is utilised for printing on a specially designed paper, the paper being provided with an absolute position coding pattern, comprising dots or markings. The digital pen 2 includes an optical sensor 8, which registers this pattern. A CPU 9 uses a mathematical algorithm to calculate the absolute position of the digital pen 2 in the form of coordinates by means of the absolute position coding pattern. The digital pen 2 includes some kind of power supply, preferably a battery 12. The digital pen 2, the specially designed paper and a navigation method is

thoroughly described in the International Patent Applications WO 01/75781 and WO 01/75783, respectively.

In order to fully understand the present invention, the functionality of the digital pen 2 will now be described briefly. By means of the digital pen 2, looking like an ordinary ballpoint pen, together with the Aoto patterned paper, a user is enabled to store and transmit basically anything he or she writes or draws to anywhere in the world.

10 The main parts of the digital pen 2 are a digital camera, or a sensor 8, an advanced image-processing unit, or a CPU 9, and a Bluetooth™ radio transceiver 11. It also contains an ink cartridge (not shown) so that the user can actually see what he or she has written or drawn. The ink cartridge is however

15 not necessary at all, the digital pen works perfectly well anyway, with the obvious disadvantage that the user is not able to see what has been written.

The dots of the specially designed paper, the Aoto pattern, are illuminated by an infrared light, making them visible for the sensors 8. Digital snapshots are taken of the pattern. The CPU 9 calculates, in real-time, the exact position of the digital pen 2 on the Aoto proprietary pattern. During image processing, snapshots are compared and information about how

25 the digital pen 2 is held is also gathered and stored. All the data from the image processor 9 is packaged and loaded into the pen memory 10, which can store several fully written pages.

30 Finally, the digital pen 2 includes a Bluetooth™ transceiver 11. The information is transmitted by means of the Bluetooth™ transceiver 11, either directly to a computer, or forwarded via an intermediate device (for example a mobile phone, a

personal computer or handheld device) to a Paper Look-up Service, a server interpreting information sent by the digital pen.

5 In accordance with the present invention, the digital pen 2 and the printer device 1 are both provided with an interface 3 for mechanical and electrical contact with each other. The printer device 1 is thus connectable to the digital pen 2 by means of the interface 3, including mechanical coupling means
10 as well as electrical direct contact means in order to enable the exchange of information with the digital pen 2. In this way the printer device 1 may use the navigation information provided by the sensor 8, the navigation information being available from the memory 10 of the digital pen 2.

15 When the printer device 1 is connected to the digital pen 2 and the printer device 1 is being used, the tip 14 of the digital pen 2 has to be covered. Otherwise the digital pen 2 would, of course, also be printing. This coverage could be
20 solved in a number of ways, the simplest solution being a mechanical cover or hood. The cover or hood could include a string attached to either the printer device 1 or to the digital pen 2, and to the cover or hood. In this way, the cover or hood is always available when needed. Another way to
25 inhibit the unwanted simultaneous use of the digital pen 2 could be to cut off the ink supply. Yet other ways to inhibit that the digital pen 2 is being used simultaneously with the printer device 1 are of course also conceivable.

30 The housing 6 of the printer device 1 should further be provided with some kind of distance elements. These distance elements are used to create a little space beneath the print head 5, in order for it to print properly. The distance

elements can be very simple and rather small, and be made of plastic, for example. Alternatively, as shown in fig. 1b, the housing 6 is designed so that the print head 5 is fastened within the housing 6 in a way that a space is created beneath it. Protruding supports 16 could for example be included, on which the print head 5 rests.

The printer device 1 could also be provided with its own sensors 7, for sensing the position of the print head 5. These sensors 7 could be used as a complement to, or at some instances instead of, the sensor 8 of the digital pen 2. If optosensors are used in the printer device 1, the characteristics of a printout surface can be sensed. Thereby, with the aid of a microprocessor, for example the CPU 9 of the digital pen 2, a determination of the position of the print head 5, the speed, acceleration and direction and/or other parameters can be obtained. In fig. 1b the printer device 1 is shown to include two sensors 7. However, one sensor 7 only is enough, in case only linear movements need to be sensed. More than two sensors could also be used, but would lead to an increase in manufacturing cost. The sensors 7 are situated in openings in the housing 6, where they are able to determine the current position of the print head 5. An example of sensors that can be used in the printer device 1 is Agilent Sensors ADCS-1120 or ADCA-2120, available from Agilent Technologies.

It is however preferred that the sensor 8 of the digital pen 2 is used, since the printer device in that case can be made very simple, containing only the print head 5 and electrical and mechanical coupling means to said digital pen 2. Thereby a printer device 1 that is less expensive to manufacture can be provided. One situation when optosensors sensing the structure

of a printing surface are advantageous, is when a user wishes to print something on a surface not provided with the Anoto pattern described above.

5 A microprocessor could also be included in the printer device 1, within the housing 6. The main task of this microprocessor (not shown) would then be to control the printing functions of the printer device 1, that is, the print head 5 and the sensors 7. In a patent application SE 0102542-8, assigned to
10 the same applicant as the present application and included hereby by reference, an algorithm is described for calculating the locations of the individual nozzles of the print head 5 in relation to the sensors 7.

15 The combined printer device 1 and digital pen 2 may be used in a variety of applications, a number of which will now be described.

When the digital pen 2 is used today, on the specially
20 designed Anoto papers, different template papers are used for different purposes. Thus, one paper is used for printing e-mails on, another to print an SMS, and so on, which forces the user to bring along a number of different writing pads including these templates. In accordance with one application
25 of the present invention, the printer device 1 may be provided with a memory (not shown) including these different templates. The templates could alternatively be stored in the memory 10 of the digital pen 2. The templates may include a template for printing an e-mail, another for printing a fax, yet another
30 for printing SMS, and still another for printing bar codes. The user thus utilises the printer device 1 in order to print a template, and accordingly only needs one writing pad including the Anoto papers. Thereafter he or she uses the

digital pen 2 to write for example an e-mail, which then can be sent by means of a mobile phone including a Bluetooth™ transceiver. Thus an inventive all-in-one device is provided, which is small and which may conveniently be brought along
5 anywhere. In addition, as mentioned, the user only needs to bring along a single writing pad.

Further, the different Anoto paper templates described above includes a number of check boxes. One such check box is the
10 "message" check box. This check box is marked with a cross or the like by the user, and is thereafter registered by the sensor 8 of the digital pen 2. The text following this marked check box should be interpreted as the message that the user wishes to send. Another check box is marked with "address",
15 which obviously is the address to the desired receiver. Yet another check box is marked with "send", which check box should be marked when the user wishes to send the e-mail, or fax or whatever kind of message the user wishes to send. In accordance with the invention, all such check boxes could be
20 written by the printer device 1, or, more preferably, be exchanged for bar codes fulfilling the same task. In an alternative embodiment, the bar codes are included in the different templates stored in the printer device 1 or the digital pen 2.

25

In another application, the printer device 1 may be used to print the Anoto pattern.

30

In still another application, the printer device (1) may be used in order to print out information retrieved by the digital pen (2). That is, the digital pen (2) receives, by means of the Bluetooth™ receiver 11, information from another Bluetooth enabled device, such as a mobile phone or a

computer, and transfers this information by means of the interface (3) to the printer device (1). The printer device (1) may thus print the retrieved information on any desired printout surface, not being restricted to the specially
5 designed Anoto paper. The retrieved information may be any kind of information, it can, for example, consist of the user's e-mails, facsimiles or Internet contents.

The present invention has been described in connection with
10 the digital pen provided by Anoto. It will however be appreciated that the printer device according to the present invention may be used in connection with other digital pens as well, the digital pens using other positioning methods.

Claims

1. Printer device (1) including a print head (5) for printing on a printing surface **characterised in** that the printer device
5 (1) comprises an interface (3) for mechanical and electrical connection of the printer device (1) to a digital pen (2), said digital pen (2) including a sensor (8) for sensing the position of the digital pen (2) on said printing surface, and that navigation information, obtained through said sensor
10 during movement of the digital pen (2) over said printing surface, is transferred to the printer device (1) by means of said interface (3).

2. Printer device as claimed in claim 1 **characterised in** that
15 the printer device (1) includes a memory for storing different templates.

3. Printer device as claimed in claim 2 **characterised in** that said templates includes one or more of the following: a fax
20 template, an e-mail template, and an SMS template.

4. Printer device as claimed in claim 2 or 3 **characterised in** that the memory of the printer device (1) includes bar codes, the bar codes corresponding to different commands to be sent
25 by means of the digital pen (2).

5. Printer device as claimed in any of the preceding claims **characterised in** that the printer device (1) includes one or more sensors (7) for sensing the position of the printer
30 device (1).

6. Printer device as claimed in any of the preceding claims **characterised in** that the printer device (2) when attached to

the digital pen (2) is used on a printing surface with a predetermined pattern.

7. Printer device as claimed in claim 6, **characterised in** that
5 said the digital pen (2) uses said predetermined pattern in order to obtain information about an absolute position, which information is sent to the printer device (1) by means of said interface (3).

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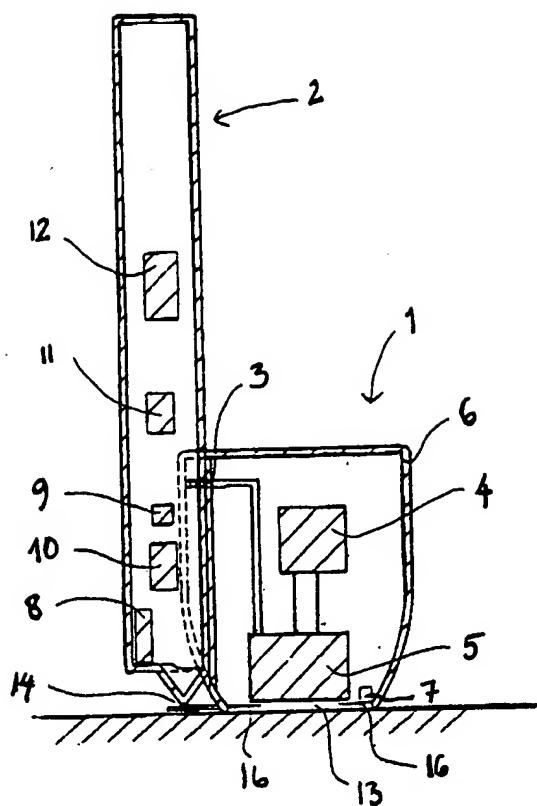


Fig. 1b

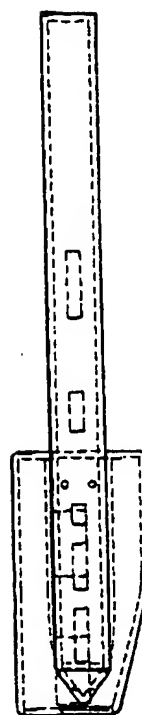


Fig. 1c

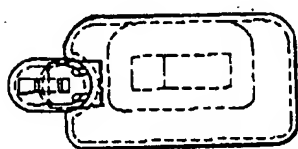


Fig. 1a

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 03/00322

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B41J 3/36, G06F 3/00 // G06K 11/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B41J, G06F, H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	WO 9819478 A2 (SYSTEM INNOVATION AB), 7 May 1998 (07.05.98), page 6, line 19 - line 24, abstract --	1-7
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☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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Date of the actual completion of the international search

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International application No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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